DOCUMENT RESUME

ED 233 004 SP 022 864

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TITLE Teacher Education and Spaceship Earth.
PUB DATE 12 Jul 83
NOTE 22p.; Paper presented at the World Assembly of the International Council on Education for Teaching (30th, Washington, DC, July 11-15, 1983).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Attitude Change; Change Strategies; Education Courses; Education Majors; *Elementary School Teachers; Futures (of Society); *Global Approach; Higher Education; Microteaching; Preservice Teacher Education; *Teacher Education Programs; Values Education; World Problems

ABSTRACT

The analogy of "Spaceship Earth" is used to suggest the necessary elements of a teacher education program that is future-oriented and that can be effective in changing and maintaining desired attitudes and behavior, particularly in relation to dealing with significant global issues and processes. Rationales are provided for a global education content-base for teacher education, as well as for analyses of values, and their consequences as a basis for commitments to action. Principles underlying the development of such a program are presented with references to research-based support. A description is given of an elementary teacher education program along these lines, carried out in schools in the San Francisco Unified School District (California). A discussion is presented of the limitations and advantages of the program as it was carried out. Necessary changes for future implementation of such programs, as well as related research questions needing investigation, are suggested. (JD)

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TEACHER EDUCATION AND SPACESHIP EARTH

"The most important fact about spaceship earth: an instruction book didn't come with it."

--R. Buckminster Fuller

Introduction

Using the concept of Spaceship Earth as analagous to a new conception of teacher education in global perspectives can be useful in describing the elements of a systems approach common to both. At least, if not pressed too far, the analogy can provide us with several creative parallels.

Spaceship Earth, a sphere of almost negligible dimensions in the vastness of space, is a self-contained system within multiple systems requiring a delicate balance between maintenance and change in order to survive and flourish. As Buckminster Fuller (1969) points out, the omission of an instruction book has forced us to discover retrospectively, just what are our most important forward capabilities. The Spaceship's crews, out of our collective intelligence, have developed

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Paper presented by Drs. Marilyn Raack and James Bixler, Professors of Education at San Francisco State University, at the World Assembly, International Council of Education for Teaching (ICET), Washington, D.C., July 12, 1983.

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multiple manuals of instructions on how to manage our planet. This has required an ever increasing range of various perspectives or ways of interpreting the world, its problems, and its future potential.

Carl Sagan in Cosmos (1980) invites us to enter a "spaceship of the imagination" and accompany him on a guided tour of the universe. A stunning array of special effects emerges from his "cosmic zoom," beginning in the realm of the nebulae, closing toward more familiar galaxies, easing into our own Milky Way Galaxy and zooming in past Supply ship Sun with a focus on our tiny, blue-white Spaceship Earth. This video presentation furnishes the crew of Spaceship Earth with a new view of multiple perspectives of systems within systems. This constitutes a critical dimension of global perspectives education.

But the increase in the range of perspectives and the concomitant exponential increase in information available and accumulating has also made the necessary establishment of priorities in all areas more difficult than ever. This problem, of course, complicates the necessary creation of new instruction manuals. We believe these problems are central in the development of global education and for related teacher education once removed.

Sagan, Elwood, and Wood (1980) have made this problem graphic in relation to the compression of our time span with

a cosmic calendar which compresses the entire lifetime of the universe into the span of a single year. Using this time frame, the first cosmic year has just ended, and we are now beginning the second cosmic year with the widespread application of science and technology, emergence of a global culture, acquisition of a means for self-destruction of the human species, first steps in spacecraft and planetary exploration, and the search for extraterrestrial intelligence.

This acceleration of our evolution is also classified by John Platt (1981) into major evolutionary jumps in the functional areas of biological evolution, energy conversion, encapsulation and habitats, methods of travel, tools and weapons, detection and signaling, mechanisms of change, and problem solving and storage. The three major methods of problem solving and storage that he describes are particularly relevant here. The first is problem solving by survival of successful individuals, with genetic storage in DNA molecular chains. These provide templets for continuation of the species. The second is problem solving by learning within the individual, through reinforcement and survival of successful behaviors, with storage in the neurons of the learning nervous system. The boon of cultural richness and diversity as well as the bane of ethnocentrism stems from this evolution. The third method

is problem solving by anticipation, by studying general laws of how the Spaceship works. Generalizations that we can apply in advance for prediction and control in specific applications of these processes have increased with electronic data-processing and feedback control of machines and ever more complex systems.

But the consequence of these jumps in evolution for Spaceship Earth is an informational overload; we live around the corners of many exponential "J" curves. The crews are inundated by accumulated and exponentially generated knowledge of how our social, political, economic and bio-ecological systems interact and work as a global system; but we find the crews' manuals ineffective in light of the nation-state models currently in use. In fact, Michael (1983) points out that more information has led to an ever-increasing sense that things are out of control. Information about environmental deterioration, economic disarray, toxic wastes, national security, the dissolution of the family, or the stumbling of the schools, all point in that direction. Possession of more information does not necessarily lead to greater understanding.

The trainers of the crews for Spaceship Earth, or teacher educators in global education, are left conflicted and unsure in using the manuals which worked satisfactorily in the

pre-global period. They need revision and updating in this transition period as described in the Creative Initiative videocassette (1980), "We live between two worlds, an old order which is dying but not dead and a new order conceived but not yet born." The acceptance of uncertainty as a continuing state and the notion of future events as probability statements, according to Michael, (1983), means "living vulnerably--and hence compassionately--requires that the sense of being in control be replaced by a sense of being cared about."

This lengthy non-linear introduction to our topic is an attempt to conceptualize wholistically some of the major problems involved in teacher education for global education as complexly interwoven, largely unresolved and, at times, overwhelming. We cannot propose resolution of the issues we have presented. What we can provide is: (1) a description of a pre-service program infused with global education for elementary teacher candidates that we have carried out over the past several years, (2) principles we have used in designing our programs with an indication of their research base, and (3) learnings we have gleaned that may have relevance for future program design, practice, and research.

Rationale for Teacher Education From A Future-Oriented Global Perspective

Global education is a process by which the individual

develops a frame of reference which enhances his/her ability to understand and respect self and others in a changing, interdependent, and finite world. The content and process of global education should encourage commitment to universal human rights, state of the planet awareness, responsible citizenship and civic participation, understanding of global dynamics, and creative problem solving in a constantly changing world. A global perspective evolves from the consideration of multiple perspectives on the world's problems, possible solutions, and future potentials, within a context of world interdependence. A global view includes caring for and empathy with others and recognizes the value of human diversity as well as commonalities among peoples of the world.

A future-oriented global perspective puts the emphasis on education for the future with consideration of the present and its historical antecedents in terms of a time continuum that has important implications for and emphasizes the quality of our lives and those of others in the future of our planet.

Education from a future-oriented global perspective aims to develop skills and attitudes such as the following:

.Reflection on ourselves as individuals in relation to awareness of others in an interdependent and changing world.

.Development of viable alternatives in promoting respect and caring for self and others in the world.

.Taking personal responsibility for effective political participation in working toward the welfare of all, as well as the good of the planet.

.Ability to handle ambiguity, diversity, change and conflict constructively.

.Commitment to critical thinking and creative problem solving as ways of dealing with the world's problems.

This summary description represents a commonly held view of global education. But the point we wish to make is that teachers must have such a global perspective in terms of knowledge, attitudes, and skills consistent with global realities in order to develop the same attributes in their students. The latter we see as a key goal of education at all levels. The need for teacher education in global perspectives is, therefore, self-evident.

In addition let us add that we agree with Hanvey that the above description of global education comes out of an essentially altruistic concern for the resolution of a certain set of world problems defined by a relatively small number of moderate liberal intellectuals. In a recent article Hanvey (1983) calls this State I. He goes on to suggest that Stage II could become a mainstream track paralleling Stage I. In terms of content focus, Stage II would deal with the more immediately felt and practical concerns of individuals and

groups as they try to cope with current local problems. We have advocated this idea for some time as practical for the teaching of younger pupils at the elementary level. Chadwick Alger (1976) in his reports on his project, "Columbus in the World," as well as developers of many similar projects that have followed, all seem to have supported this idea as well for adult introduction to global perspectives. We support this expanded conception of global education content as both functional and appropriate.

Some Principles of Program Redesign in Teacher Education in Global Perspectives

Principle 1.

An integrated global perspectives core of relevant content and values, learning skills, and teaching methodology should be a part of all teacher education programs if developing global perspectives in all students is a significant educational goal.

Goodlad (1983) reports in his recent study of U. S. schooling that pupils "Scarcely ever speculated on meanings, discussed alternative interpretations or engaged in projects calling for collaborative efforts." Most of the time they listened or worked alone. Topics in the curriculum were to be acquired, not to be explored, reckoned with and converted into personal meaning. Effective social studies and science instruction is particularly vulnerable to these omissions. Since social studies is the commonest area to which global education is assigned in the public schools it appears that students have less than

adequate opportunity to learn about global issues content in a meaningful context. Torney-Purta (1982) summarizing the findings of the study of the international dimension of undergraduate education conducted by the Council on Learning (Barrows, 1981) indicates the general lack of knowledge of global affairs on the part of college students as well as their lack of a global perspective in the sense of a context for viewing their own nation's actions and problems. Most disturbingly she reports on the poor performance of education majors, the lowest group in the sample. It is our hypothesis that most current credential candidates do not have the knowledge, skills or global perspective required to teach global education effectively and are thus unable to remedy the deficiencies cited. Our own experience of over twenty years each in the field of teacher education confirms the need for global issues content within teacher education programs. This in no way denies the need for more attention to this component as part of an undergraduate general education or liberal studies programs. Surely our job as teacher educators would be easier if we could help students draw upon and organize global issues knowledge which they already possess in order to help them learn how to use it effectively with their pupils.

Principle 2.

Current theory and practice using an experiential approach to teaching and learning with classroom application and work with pupils in school settings is the most effective way of handling course work in teacher education, if it is aimed at behavioral and attitudinal change.

Joyce and Showers (1980) in their extensive development and use of models of teaching have found that to be most effective teacher training should include the following components: (1) theory, (2) demonstration, (3) practice and feedback, and (4) classroom application. They argue that this model is even more essential when teachers are asked to master new teaching strategies and/or content in order to put alternative curriculums into operation. Our experience indicates that global education is quite "new" to most of our students. Therefore, it requires new behavioral and attitudinal learning and change on the part of our credential students.

Joyce and Showers discuss the necessity of using these four training components in combination in a model that has significant impact on students. They present four levels of training, in terms of impact: (1) awareness, (2) the acqusition of concepts and organized knowledge, (3) in learning principles and skills, and (4) the ability to apply those principles and skills in problem solving activities. Only after this fourth level of training has been reached can we expect significant impact on the education of children. They analyzed

over 200 studies investigating the effectiveness of various combinations of training components. The critical question of transfer of training to the classroom level was rarely addressed in these studies. They found that teachers can learn a considerable repertoire of new content and teaching strategies. But, if one is interested in classroom transfer and teacher application and problem solving that effects pupil learning (Joyce's level number four), one must include "coaching for application" in the classroom, especially for new learnings on the part of teachers. (Coaching is defined as use of feedback and support of use in ones own classroom often provided mutually by teacher colleagues.) Our own experience has made it clear to us that use of the Joyce training model in teacher education can have a more powerful impact on student learning than the more traditional lecture-oriented instruction, especially in a program with a global perspectives core.

Principle 3.

If teachers tend to teach as they are taught, a team-teaching model for students and instructors which emphasizes collaboration is more effective than a more traditional competitive model in teacher education with a global perspective core.

Research support for the use of collaborative models of teaching and learning has recently been summarized by K. Snyder (Snyder and Anderson, 1979) in a meta analysis of such studies. This support for use of collaboration is suprisingly

extensive. A recent publication (Wingspan, 1979) devoted an entire issue to the subject of collaboration. We found many of the findings to be useful in supporting our work (Johnson and Johnson, 1983). We view this research on collaboration as additional support to philosophical compatability between the goals of global education as we view them and use of the collaborative model in teacher education.

Other more general principles of program implementation which space does not allow us to expand upon here include:

4. Use of interactive technology, specifically use of video-taping of teaching.

5. Evaluation of all activities in the program with an emphasis on self-evaluation and peer evaluation.

6. Presentation and integration of the findings of research on effective teaching, school improvement, and other areas relevant to a broad-based teacher education program geared to preparing professionals.

In addition, we have implied support for the following in various parts of this paper:

7. Emphasis on personal connections to global issues including contexts from the local to the national to the global.

8. Concept of change over time on the following continum:

past-----Present-----FUTURE

9. A values analysis orientation to global issues stressing

a search for alternatives with a commitment to decision making and action to help bring preferable futures into being.

Description of a Program in Preservice Teacher Education: San Francisco State University

The authors conducted a program of teacher education in global futures for three semesters in cooperation with three field-based school sites in the San Francisco Unified School District. Two of the schools were largely black, the third was mixed ethnically. The program involved an average of twenty university students each term working with the two of us as instructors who taught in two concurrent required credential courses with integrated content: "Analyzing Child Behavior in a School Setting" and "Curriculum in the Elementary School and Social Studies." The two courses were scheduled for two five-hour sessions a week including field-based experience.

Once a week our group traveled by chartered bus to a school chosen as our field setting. We assigned our students, in groups of from three to five, to various classrooms and they observed and worked with small groups of pupils, four to six each, for approximately two hours per week. During this period, each of several classes was divided up among our student teams so that these cooperating teachers were freed to observe our students or meet with us on site. We either observed the students teaching their pupils or conducted inservice meetings with the cooperating teachers.

Our university students worked collaboratively in teams to create mini-units on global education issues which they used with their pupils. Recognizing the difficulty in finding enough teachers who were teaching global education or could even demonstrate it and wanting to place our students all in one school, we chose to demonstrate global education strategies ourselves on campus, have our students practice first on their peers using videoed micro-teaching, and then try out their ideas on their pupils.

This worked surprisingly well even though our students were beginning credential candidates taking their first two education courses in our program. This technique has the added advantage of not only preventing our students from observing practices irrelevant or inappropriate to global education but relieved the cooperating teachers of the ordeal of trying to demonstrate something with which they were largely unfamiliar. They seemed grateful!

Another important feature of our program was the use of video-taped micro-teaching. Each student taught a small group of his/her peers from two to three videoed lessons for which he/she had prepared a lesson plan with appropriate visuals and materials on a global issues topic. The rest of the class observed and critiqued the lesson both verbally and in writing, using forms with specific criteria listed. Each video teacher

received written feedback from each observer, viewed his/her video tape during the next few days and self-evaluated the performance in writing. The videoed micro-teaching took approximately two hours per week of class time. This was an important feature in implementing the part of Joyce's training model on practice and feedback. Strategies required in preparing these lessons included values analysis, questionning techniques, and a variety of teaching strategies modeled by us as instructors and chosen by our students to enhance their teaching of global perspectives.

While this brief description does not do justice to the richness and complexity of our program and undoubtedly has left out some important components that should have been stressed, we think it gives its essential flavor.

To summarize our impressions after teaching and modifying this program over three semesters--it was highly stimulating but also exhausting for both faculty and students. Our educational institutions are not set up to support change and innovative practices. It therefore takes strong motivation, unflaging energy, low dependence on external rewards and most of all perseverence, to sustain ones efforts. Because this program represented a small sub-system within many larger systems, often supporting different values and modes of behavior, it was frequently difficult to feel that one was making a

significant impact. On balance, however, we feel the experience has been worth the effort.

Our Learnings and Their Relevance for Future Program Design, Practice and Research in Teacher Education

Just as global education requires a unifying philosophy with definite overall goals, values, and methodology, so does a program in teacher education. Global education cannot be effective as a collection of courses and neither can teacher education in our opinion. In our "program" which was really only a third of the total credential sequence and not connected in any way with the rest, we and our students felt the disjuncture. Both adequate time and continuity are needed to develop significant goals, especially those involving major changes in behavior and attitudes. Teams that work together over time can also provide integration, personal connecting and accountability for outcomes.

Credit for professors engaged in field work.

Staffing formulas at the university level need to be changed, at least in California, to give professors credit for work with students in field settings in courses other than student teaching and for work with in-service teachers in field settings. (Only one of our two-person team received teaching credit each term.)

Early global issues content and skills for all students.

Significant, organized input of knowledge on global issues should be a part of all undergraduate coursework accompanied by skill training in areas such as problem solving, generalizing, discussion skills, questionning techniques, and values clarification. (It should of course begin early in the elementary years and continue through adulthood.)

Field-based settings and Clinical Supervision.

A field-base with professorial observation of students and feedback on performance is necessary. Also required: time and strategies for building rapport and credability between university staff and school personnel; instruction in clinical supervision for all involved; and ultimately a coordinated, collaborative effort between school and university staffs, students, and pupils.

Use of interactive technology.

Wider use of appropriate technology is essential with training for faculty, adequate support staff, adequate funds for modern equipment, A-V materials and their production.

Data collection on students and follow-up in the field.

Data collection on students, expecially in terms of follow-up, is essential. With the provision of base-line data as a beginning, action research might be more widely practiced to give us the necessary data on which to revise and improve our programs. On-the-job support and continued training of our

students is also needed.

Adequate funding.

Major funding for education at the local, state, and federal levels must support a continuing integrated systems approach if any of the above is to become possible. This implies multiple-year funding on an ongoing basis, devoid of political manipulation. It is clear to us that increased funding from the private sector, including corporations supporting their own enlightened self-interests, will also be necessary.

Summary

In this paper we have used the analogy of "Spaceship Earth" to suggest the necessary elements of a teacher education program that is futures-oriented and can be effective in both changing and maintaining desired attitudes and behavior, particularly in relation to a global perspective in dealing with significant global issues and processes. We have suggested a rationale for teacher education with a global perspective that includes a global issues content-base with related teaching-learning skills as well as analysis of values, and related actions and their consequences as a basis for commitments to action. Principles underlying the development of a program consistent with the above are presented with reference to cited research-based support. A brief description of an elementary teacher education program along the lines described, carried out by the authors in

in cooperation with schools in the San Francisco Unified School District between 1980 and 1982, is also given. We present both the limitations and advantages of the program as it was conducted. Necessary changes for future implementation of such programs are suggested.

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